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The limits of  $x$  are  $ny=x_2$  and  $n(c-y)=x_1$ ; of  $y$ , 0 and  $\frac{1}{2}c$ .

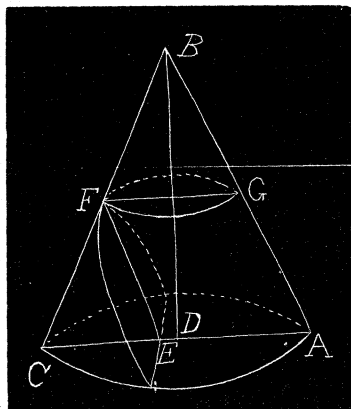
$$\begin{aligned}\therefore V &= 2 \int_0^{\frac{1}{2}c} \int_{x_2}^{x_1} \sqrt{[n^2(c-y)^2 - x^2]} dy dx \\ &= \int_0^{\frac{1}{2}c} \left\{ \frac{1}{2} \pi n^2 (c-y)^2 - n^2 (c-y)^2 \sin^{-1} \left( \frac{y}{c-y} \right) \right. \\ &\quad \left. - ny \sqrt{[n^2 (c-y)^2 - n^2 y^2]} \right\} dy \\ &= \frac{1}{6} \pi n^2 c^3 - \frac{2}{3} n^2 c^3 = \frac{1}{18} n^2 c^3 (3\pi - 4) \\ &= \frac{1}{18} R^2 c (3\pi - 4).\end{aligned}$$

But  $c=12$ ,  $R=4$ .

$$\therefore V = 32\pi - 1\frac{2}{3}.$$

Volume of cone  $= \frac{1}{3} \pi R^2 c = 64\pi$ .

$$\begin{aligned}\therefore \text{Required vol.} &= 64\pi - (32\pi - 1\frac{2}{3}) = 32\pi + 1\frac{2}{3} \\ &= 143.1978 \text{ cubic feet,} \\ &= 115.07 \text{ bushels.}\end{aligned}$$



Also solved by P. S. BERG and C. C. CROSS.

[NOTE.—In the figure, the point  $E$  should coincide with  $D$ . ED. F.]

65. Proposed by F. P. MATZ, D. Sc., Ph. D., Professor of Mathematics and Astronomy, Irving College, Mechanicsburg, Pa.

Show that the path of a projectile moving with a constant velocity is an inverted catenary of equal strength.

No solution has yet been received.

## PROBLEMS FOR SOLUTION.

### ARITHMETIC.

102. Proposed by ALOIS F. KOVARIK, Professor of Mathematics, Decorah Institute, Decorah, Iowa.

A's age is to B's as 2:3. 20 years from now their ages will be to each other as 4:5. What are their ages, respectively?

103. Proposed by WALTER H. DRANE, Graduate Student, Harvard University, 65 Hammond Street, Cambridge, Mass.

Find proceeds of a note discounted at a bank for 10 years at 10%. What is the meaning of the result?

\*\*\* Solutions of these problems should be sent to B. F. Finkel not later than January 10.

### ALGEBRA.

92. Proposed by ELMER SCHUYLER, High Bridge, N. J.

Given  $x^2 - yz = 1$ ;  $y^2 - xz = 2$ ;  $z^2 - xy = 3$ . Find  $x$ ,  $y$ , and  $z$ .